

## **Chapter 2.1**

### **A brief history of the Maryland Coastal Bays**

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#### **Abstract**

From the early native Americans who hunted and fished the creeks and began to farm the lands, to the Europeans who settled later, to pirates and smugglers looking for hideouts among the perplexing coves and thick marshes, to most recently, the retirees and vacationers in search of more genteel escapes, Maryland's Coastal Bays have beckoned with abundant natural scenery and resources. The human population has gradually risen and, along with natural fluctuations, has promoted change as a common theme within the Coastal Bays ecosystem. Storms come and go, battering the islands and blasting inlets for Atlantic waters, which, if not stabilized, are soon closed by sandy sediments. Stocks of fish and shellfish fluctuate, forcing the waterman and recreational angler alike to be flexible. Other natural factors also constantly change. Eelgrass thrived prior to 1930, only to be reduced by a mysterious wasting disease and then returned years later. Shorelines crumble under the unrelenting force of wind and wave, often returning as shoals far from their origin. Algal populations, microscopic cells drifting unnoticed most of the time, can swell in blooms so massive as to change the clarity and color of the water. As these communities move through this century, changes in the ecosystem both natural and, more increasingly, human-caused will shape the future of the Coastal Bays.

#### **Pre-History: Pleistocene to Holocene**

The Maryland Coastal Bays are located on the Atlantic margin of the Delmarva Peninsula, which lies entirely within the Atlantic Coastal Plain Province. The Delmarva Peninsula was formed over the last 5 to 10 million years. During the late Miocene and early Pliocene Epochs, extensive gravel sheets were deposited over a large area of the coastal plain, forming the general outline for the present day configuration of New Jersey, the Delmarva Peninsula, and Maryland's western shore (Owens and Denny 1979). Through the multiple glaciations of the Pleistocene Epoch, the Delmarva Peninsula continued to take on its present-day shape. During sea level low stands, the ancestral Delaware and Susquehanna Rivers deposited large volumes of sandy sediments on the Atlantic shelf. These sediments were transported and deposited onto the coastal margins of the Peninsula during the ensuing sea level rise or transgression. These transgression deposits are evident today. Based on geomorphic features and subsurface data, Demarest

and Leatherman (1985) identified and mapped five distinct linear physiographic features along the Delmarva Atlantic shore. They attributed each of these features to a distinct sea level high stand ranging in age from over one million years to 60,000 years. The last (and youngest) feature corresponds to the present-day mainland shoreline along Sinepuxent and Chincoteague Bays.

At the height of the last glacial period of the Pleistocene epoch, roughly 18,000 years ago, sea level was 120 meters below present level (Pielou 1991). As a result, the continental shelf was exposed, with Maryland's Atlantic coastline located approximately 97 kilometers east of present location. Global temperatures began to rise around 17,000 years ago, harkening the end of the last ice age. The Holocene Epoch began roughly 10,000 years ago with the final retreat of the glaciers. The Coastal Bays started to resemble their present day configuration within the last 5,000 years when sea reached a level approximately six to seven meters (roughly 20 feet) below present mean sea level and started to flood the study area (Figure 2.1.1). Deceleration in sea level rise may have induced the formation of barrier islands, and consequently the bays and marshes behind them. Carbon 14 dates from peat and sediment data from cores collected in Chincoteague Bay and Assateague Island provide evidence of the existence of back bay or lagoonal environments, suggesting that barrier islands existed seaward of Delmarva mainland for at least the past 4,500 years (Biggs 1970; Toscano et al. 1989), sheltering the mainland shore. Their general morphology would be controlled by wave climate, tides, sediment texture, and supply as well as the antecedent topography of the exposed shelf. The northern bays (Assawoman and Isle of Wight Bays in Maryland; Rehoboth, Indian River, and Little Assawoman Bays in Delaware) were formed as the stream valleys of major drainage systems flooded (Wells, 1994; Chrzastowski, 1986). These bays were separated from the ocean by bay mouth barrier islands that form adjacent to eroding headlands, a major source of sediments. Further south, away from the eroding headlands, one or more barrier island spits, similar to present day Assateague Island probably existed separating Chincoteague Bay from the ocean. The barrier island spit, whether a single island or several, probably grew in a southern direction, maintained by strong littoral transport of sediment.

### **First contact: 900 – 1524 A.D.**

The first Native Americans are thought to have entered the present Maryland Coastal Bays watershed around 10,000 years ago. These first human visitors are believed to have only used the region as an intermittent hunting ground, forming no permanent settlements. True settlement was not likely to have occurred until around 900 A.D. with the beginning of maize agriculture (Rountree and Davidson 1997). These earliest settlers built small villages of low reed huts along tributaries some distance from the bays. They gathered nuts from oak-hickory and oak-pine forests and tubers from marsh plants, known as tuckahoe. They fished for anadromous fishes (striped bass, *Morone saxatilis*; white perch, *M. americana*; shad, *Alosa* spp.) by weir in the tributaries, leaving no evidence of watercraft other than small dugout canoes. They also collected abundant shellfish from the shallows.

Native Americans of this period were organized into several localized chiefdoms, including the Pocomokes, Assateagues, and Chincoteagues. They spoke an Algonquin dialect, making them part of this large regional confederacy. They formed small settlements, but probably moved often in search of new farmland or gathering grounds. Before European contact, the population of the Coastal Bays watershed most likely never exceeded 300 permanent residents, although many groups likely moved in and out of the watershed on a regular basis (Hager 1996).

### **Second contact: 1524 – 1850 A.D.**

The first Europeans to visit Maryland's Coastal Bays region are believed to have been the crew of Giovanni da Verrazzano in 1524. Verrazzano, sailing under the sponsorship of King Francis I of France in an attempt to find a short passage to India, explored the east coast of North America from 30° to 50° N latitude (roughly modern-day North Carolina to Maine). He sent 20 of his crew ashore near the present-day Virginia-Maryland border and they explored inland to the Pocomoke Swamp, where the dense vegetation forced them to turn around (Truitt 1971). Verrazzano kept a journal of his travels and his descriptions of the landscape and the natives led to the accepted theory that he was the first European to explore this area.

In 1649, the British vessel *Virginia Merchant* sailed for Jamestown, but was struck by a terrible storm. The battered ship anchored off of present-day Assateague and sent a small group ashore to explore the island. The ship was unable to return as scheduled to retrieve the party. As a result, ten of the group died of exposure on the wind-swept island. Without provisions, the remaining party consumed six of the ten dead in order to survive. Only the arrival and subsequent hospitality of a group of Native Americans saved the remaining party members. One of the exploration party, Henry Norwood, recorded the details of this expedition, including a description of how the Native Americans provided them food and shelter until an English settler escorted them first to his nearby plantation house and then back to Jamestown (Truitt 1971).

The first European settlement of the lower Eastern Shore of Maryland occurred prior to 1649, as evidenced by the local settler who helped rescue the Norwood party. At first, present-day Worcester and Wicomico counties were part of Somerset county, named for the sister of the landowner, Cecil Calvert (then Lord Baltimore). Calvert later divided all of his land (from the Virginia line to just north of Philadelphia) into two counties, the southernmost extending from the northern border of present-day Delaware to the present-day border with Virginia and named Worcester County. However, these counties never materialized and the land was slowly parceled out over the next half-century. Colonel William Whittington was granted most of Assateague Island in 1702, which he subdivided into parcels for livestock grazing (Truitt 1971). However, few of the parcels sold and most became vacant lands.

The first European settlers were most likely farmers, hunters and trappers, and fishermen (Hager 1996), not unlike their Native American predecessors. Frequent storms through

the late 1700's and early 1800's opened and re-opened inlets to Sinepuxent Bay north of Tingles Island (Figure 2.1.2). These inlets provided a brackish environment conducive to oyster (*Crassostrea virginica*) establishment and consequent harvest. However, the area was geographically remote and, until railroads were established in the nineteenth century, population was generally small with few established settlements. This remoteness, as well as ready access to the ocean, led to the popularity of the Coastal Bays as a hideout for pirates in the early 1700's (including Edward Teach, a.k.a. Blackbeard). Later, Civil War draft-dodgers from both sides escaped into the forests and marshes, as did prohibition era rumrunners in the early twentieth century.

## **Into the twentieth century**

### Demographics

Following the Civil War, advances in transportation led to an increase in population growth. Post-war disillusionment led to a small-scale flight from eastern cities into more remote areas, including those surrounding the Coastal Bays (C. Petrocci, pers. comm.). Anticipation of a railroad terminal connecting Ocean City to Washington and Baltimore led to a marked increase in land speculation in the 1870's. However, the project never materialized, and many of the purchased plots in Ocean City also became vacant. Foreshadowing future development of Fenwick Island as a tourist attraction, Scott's Ocean House opened at Green Run in 1869. This seasonal hotel, the first on the island, was a popular with visitors from Mid-Atlantic States. Ocean City was becoming a popular resort destination during this period, with several hotels opened near the beaches. This ultimately caused the demise of Scott's, which closed in 1894. Ocean City did not become an incorporated municipality until 1880, building its first wastewater treatment plant in 1937.

Development proceeded through the twentieth century, from small communities of watermen and farmers to booming resorts and beach access communities currently present in and leading into Ocean City. Advances in transportation certainly fueled these increases, the aforementioned railroads leading the way. In 1951, the Bay Bridge crossing the Chesapeake Bay from Annapolis to Kent Narrows opened. This bridge issued in a new era of population growth, as not only vacationers, but more permanent residents found it easier to get to and from property near the ocean (I. Fehrer, pers. comm.). This trend continued, despite a series of strong tropical storms and hurricanes through the 1950's and 1960's. Development centered on Fenwick Island in Ocean City and in West Ocean City on the mainland. Largely in response to this run-away development, the State of Maryland purchased the northern part of Assateague Island and established Assateague State Park there in 1964. In 1965, the remainder of Assateague Island was designated a National Seashore to be managed by the National Park Service.

On the mainland, outside of Ocean City, development and population growth remained slow throughout the twentieth century. Agriculture was and is the mainstay of this area. The aforementioned transportation increases led to a shift from regional markets to Washington and Baltimore. Large-scale production of chickens began in the late 1960s,

with the Perdue Company opening its first broiler processing plant in 1968 in nearby Salisbury. Currently, the population outside of Ocean City remains relatively low and the lifestyle “comfortably rural” (Hager 1996). However, the disproportionate population rise in the resort communities masks this observation. In fact, the population of Worcester county doubled between 1940 and 1996 (Table 2.1.1), a fact made more interesting in that nearly three centuries were required to attain the 1940 population (Hager 1996).

### Natural Resources

The myriad and often ephemeral fisheries of the Coastal Bays define not only the development of human communities on land, but also serve as perhaps the only record of ecological conditions during the post-Civil War period through the early twentieth century. Frequent hurricanes opened inlets in several portions of the islands, including the aforementioned Sinepuxent inlet and another at Green Run in 1868 (Figure 2.1.2). The latter led to a lucrative oyster harvest in the Bays until its closure in 1880. Worcester county and Ocean City had money for cost sharing with the United States Army Corps of Engineers (USACE) to build an inlet in 1929. However, the stock market crash later that year caused the project to be postponed. Ironically, a hurricane came through in 1933 and created what is now the Ocean City inlet. In 1934, the USACE stabilized this navigable inlet, inducing a greater volume of water to flow in and out of the northern Coastal Bays than would have flowed naturally. Subsequent inlet scouring by currents and jetty improvements further increased the hydraulic efficiency of the artificially enhanced inlet. Many watermen believed that the increased salinity would lead to productive oyster harvests. The inlet did have profound effects on the fauna of the Coastal Bays, as the salinity rose to that of ocean water. The effects on the oyster industry were not as expected – the influx of ocean water allowed predators to flourish, as well as competitors that vied for space with spat. Disease may have also contributed to the decline of oyster harvests, or at least prevented recovery. The combination of increased predation, fouling, disease, and over-harvesting probably led to the decline of oyster populations to the relicts of today (M. Tarnowski, pers. comm.).

The opening of the Ocean City inlet, while proving detrimental to oysters, was a boon for hard clams (*Mercenaria mercenaria*). Before the inlet, hard clams were confined to the southern portions of Chincoteague Bay where the salinity was high enough to sustain this brackish water species. Clam harvests climbed sporadically through the 1960s, when hydraulic clam dredging came to fore. Currently, clam populations are stable and harvesting effort is relatively low.

Bay scallops (*Argopecten irradians*) also sustained a small commercial fishery in the higher salinity areas of southern Chincoteague Bay through the 1920s. New fisheries for this species were anticipated with the opening of the Ocean City inlet. However, the story of the bay scallop is a story of declining habitat, specifically the seagrass beds where they live (M. Tarnowski, per. comm.). Eelgrass (*Zostera marina*) declined precipitously through the 1930's due to wasting disease and new scallop fisheries never materialized. Recently, bay scallops have been found in all bay segments except Newport Bay, and this

range expansion along with increases in sea grass coverage lends hope to their establishment in the Coastal Bays.

Another popular fishery in the Coastal Bays is that for blue crabs (*Callinectes sapidus*). At times, over 100 boats come out of Chesapeake Bay for spring crab season, taking advantage of the earlier warming. Female Chesapeake crabs tend to be larger, so those watermen crabbing the early Coastal Bays crab season find it more lucrative to return to the Chesapeake. However, some usually stay on to take soft crabs, which molt synchronously in the Coastal Bays (Boynton 1970). Catch records are available back to 1890 (summarized by Murphy 1960). The catch was generally low in the nineteenth through the early twentieth century, but then increased dramatically, with an overall haul of 3,757,300 pounds in 1950 (Murphy 1960). Crab populations tend to fluctuate (Davis et al. 2002) over years, as they did through the 1970's. Recently (1980's through present), catches seem to hover around 1,000,000 total crabs or 1.17 million pounds (hard, soft, and peeler) per year (see Chapter 8.6 for more information). Like bay scallops, seagrass beds are critical habitat for blue crabs. However, there was no apparent decline in crab harvests during the period between the 1930's and early 1980's when sea grasses were absent and then recovering at low densities (Boynton et al. 1993). Also, in the early 1990's, the parasite *Hematodinium* sp. was observed killing many crabs in the Coastal Bays.

Finfish have arguably the most tumultuous history among the many Coastal Bays fisheries. Watermen landed millions of pounds of bluefish (*Pomatomus saltatrix*), "fatbacks" (mullet: *Mugil cephalus*), striped bass (*Morone saxatilis*), and weakfish (*Cynoscion regalis*) from the late 1800s through the 1930s (Murphy 1960). Large numbers of "bunkers" (menhaden: *Brevoortia tyrannus*) were also harvested, mainly for use as fertilizer (Truitt 1971). However, with the opening of the inlet in 1933, landings from the Coastal Bays declined mainly due to effort shifting to more lucrative offshore fisheries (Boynton et al. 1993). Despite a paucity of landing data, many species remained abundant in the Bays through the 1940s (M. Simpson, pers. comm.). Harvest remained low through the mid-twentieth century until 1970, when commercial landings increased. A record harvest of 103,635 pounds was landed that year, mostly bluefish, weakfish, and spot (*Leiostomus xanthurus*). This landmark year signaled subsequent increases in landings from the bays (Boynton et al. 1993). Still, yields from oceanic fisheries dwarfed those from the Coastal Bays, and more emphasis has been placed on recreational fishing in recent years.

Despite the popularity of the Coastal Bays as a recreational fishing site, little historic data is available. However, anecdotal evidence thrives in the collective memories of many long-time residents. Many fisheries seem to cycle, reflecting the history of transitions in the Bays. For instance, spot were abundant in both commercial and recreational catches in the 1930s and 1940s, then were not seen for a decade or more, before returning in the 1960s (M. Simpson, pers. comm.). Shellfish fishing, excluding blue crabs, seems to follow the trends mentioned earlier for commercial fisheries. Despite no apparent crash in commercial harvest, some long-time residents feel that blue crabs have been harder to find for recreational "chicken-neckers" in recent years (D. Wilson and M. Sampson, pers.

comm.). This trend is reflected in decreased sales in recreational crab pots and associated gear (C. Cummins, pers. comm.). This trend may indicate a changeover in how visitors choose to recreate in the bays, as success usually requires some knowledge of where and when to crab.

Recreational fishing for summer flounder (*Paralichthys dentatus*) is of special mention. Many vacationers have historically come to the Coastal Bays to fish for flounder. This tradition continues to this day. From the late 1960's through the 1970's, flounder were the most sought after recreational fish (M. Sampson, pers. comm.). Although, some recreational anglers feel that catches of legal-sized flounder have been declining in recent years (B. Abele and M. Sampson, pers. comm.) and targeted levels of abundance have not been reached, the stock is no longer considered overfished. A combination of overfishing and degraded water quality may be to blame for this decline. With catches down, many anglers are shifting to more productive offshore fishing grounds. Since the population crash of this species in 1989, strict management measures through harvest restrictions and seasons have restored much of this resource throughout the mid-Atlantic region.

As telling as observations of sport fish abundance and catchability are, some anomalous observations may provide further evidence of the fluctuations present in the Coastal Bays. In the late 1980's, northern puffer fish (*Spherooides maculatus*) were so abundant as to spawn a small-scale fishery. This boost seemed to correspond with an increase in serpulid worm populations, at times so numerous that masses of their calcareous casings were navigation hazards. In the late 1970's and into the 1980's, a spring run of monkfish (*Lophius americanus*) occurred on an annual basis (M. Sampson, pers. comm.). The DNR Fisheries Service observed them coming in the Ocean City Inlet each spring to spawn in varying numbers annually since 1971, though never in large numbers. Storms, which had occurred frequently through the early 1970's, drastically declined during this time. These two examples are pure speculation, and these occurrences could be coincidental. Booms in species abundance, however ephemeral, are rarely random events. However, they serve to illustrate the variety of interactions present in this ecosystem.

In summary, the natural opening and closing of inlets in the barrier island was a major force in the success or failure of early commercial and recreational fishing efforts in the Coastal Bays (Figure 2.1.2). An article featured in Maryland Fisheries journal published by the Maryland Conservation Department in March 1931 emphasizes this assertion. The article comments on the severe storm of February 1920 that opened a wide, navigable inlet in what is now upper Assateague Island, stating: "The results from the opening of this inlet were almost magical. Crabs came up from the lower Chincoteague Bay and the sponge crab was found above Ocean City. The clamming industry began almost at once as a result of the salting of the water, and in five years clams were being taken by the millions. Fishermen were able to make as much as \$35 a day clamming. Oysters were planted even above Ocean City and business commenced to thrive. Then the inlet began gradually to close and this was accompanied by the death of shell-fish of all kinds."

**The Twenty-first Century: What does the future hold?**

Clearly, Maryland's Coastal Bays have been the scene of tremendous change over time. But what changes may come as this century progresses? Human population is expected to climb steadily (Hager 1996; also see Table 2.1.1), with many more permanent residents as opposed to summer visitors (C. Cummins, pers. comm.). Changes in land use will bring about added stresses to the Bays ecosystem (Hager 1996). Proactive management of development and agriculture, along with improvements in wastewater and run-off projects, will be necessary to preserve the integrity of this ecosystem. This necessity runs concurrent with the population trend, for it is precisely the opportunities afforded by this ecosystem integrity that draws people to this area. A recent survey of boaters strongly supports this assertion; a majority chose good fishing, scenic quality, or peaceful location as their main reasons for living near or visiting the Coastal Bays (Falk and Gerner 2002). The Coastal Bays community, both ecological and human demographic, will certainly continue to change over time. The capacity to respond to this change over time should be preserved.

**Coastal Bays Ecological and Demographic Timeline (1820-2003)**

(Note: Locations of inlets mentioned in the timeline are shown in Figure 2.1.2)

1820-1844-Oyster harvest coincident with open inlet. Inlet closed 1844.  
1837-First record of wild ponies.  
1868-Green Run inlet opened. Lucrative oyster industry. City of Berlin incorporated.  
1874 – Hurricane.  
1876-The List of Fishes of Maryland published, including Coastal Bays species.  
1877-Hurricane.  
1879- Hurricane.  
1880-Green Run inlet closed. Oysters declined in Sinepuxent. Ocean City incorporated.  
1881-Hurricane.  
1882-Two hurricanes.  
1886-Two hurricanes.  
1894-Hurricane off shore.  
1908-Seagrass beds present in upper St. Martin River.  
1914-A Notes on the Fishes at Ocean City, Maryland was published in the journal *Copeia*.  
1916-1787 barrels of “choice” fish harvested.  
1920-Sturgeon (caviar) fishery declines.  
1921-1921 inlet opened. Improved fish and crab populations.  
1928-State begins commercial landings survey of shellfish from bays.  
1929-1921 inlet closed.  
1930-Eelgrass “wasting disease” begins destroying grass beds.  
1933-Hurricane off shore in August. **Storm surge opens Ocean City (OC) Inlet.**  
1934-US Army Corps of Engineers stabilizes OC Inlet.



- 1935-West Ocean City harbor created by US Army Corps of Engineers.
- 1936-Hurricane off shore.
- 1937-Ocean City sewage plant opens, discharging into OC Inlet.
- 1943-Hurricane.
- 1944-Hurricane and two tropical storms. Fishing (croaker, spot) generally good (through the 1940s).
- 1948-First dredging of Sinepuxent and Isle of Wight Bays.
- 1950-Perdue opens Showell chicken processing plant.
- 1952- State hard clam study.
- 1953-Hurricane Barbara.
- 1955-Tropical Storm Connie.
- 1958-MSX oyster disease first reported. Heyday of lease oyster beds.
- 1959 - Bishopville Dam built: The dam was built as a “tumbling dam” to keep the river below open for fishing and small boat navigation.
- 1960-SSO and Dermo oyster diseases first mentioned. Tropical Storm Brenda followed by offshore Tropical Storm Donna.
- 1962-Ash Wednesday Storm. This nor'easter caused much damage along the Eastern Seaboard, including Ocean City. Seventy mph sustained winds and 40-foot seas were recorded over the three-day (five tidal cycle) duration of this storm. Fenwick Island was breached at 71<sup>st</sup> Street and Assateague Island was breached just south of the Ocean City Inlet.
- 1964-Assateague State Park established.
- 1965-Assateague Island National Seashore established. Grey crab disease (*Paramoeba perniciosus*) first reported in Chincoteague Bay.
- 1967-Tropical Storm Doria.
- 1968-Ocean Pines development established.
- 1969-Decent numbers of seagrass beds and scallops noticed during trawl surveys. Assateague Ecological Study begins (through 1971). State ends annual shellfish landings survey. Ocean City sewage plant upgraded and outflow moved offshore.
- 1970-Begin to see seagrass recovery in southern Coastal Bays.
- 1971-Tropical Storm Doria.
- 1972- DNR Fisheries Service begins routine trawl and seine surveys for finfish and blue crabs. Federal Clean Water Act passed.
- 1975-Seagrass and scallop declines.
- 1980-US Army Corps of Engineers identifies need to replenish sand along Ocean City beaches.
- 1983-First brown pelicans (*Pelecanus occidentalis*). Last commercial oyster harvest. MDE intensive surveys commence.
- 1985-Offshore hurricane Gloria. Hurricane Danny earlier. Tropical Storm Henri.
- 1986-VIMS seagrass aerial surveys begin. Observed decline in recreational flounder fishing.
- 1987-US Park Service begins routine water quality monitoring in Newport, Sinepuxent, and Chincoteague bays.
- 1988-Coordinated beach replenishment (Army, State, local) commences.
- 1989-Large numbers of pufferfish (*Sphoeroides maculatus*) present.
- 1990-EPA EMAP\* assessment begins (through 1992).

- 1991-Green crabs ( *Carcinus maenus* ) established.
- 1992-Washover event (nor'easter) impacts piping plover habitat.
- 1993-Brown Tide probable from archival samples. DNR begins long-term hard clam survey (includes scallop numbers). EPA Joint Assessment begins (through 1996). DNR Molluscan Inventory begins.
- 1995-Maryland Coastal Bays nominated to National Estuary Program.
- 1996-Japanese shore crabs (*Hemigrapsus sanguineus*) established.
- 1997-DNR plants bay scallops. DNR Molluscan Inventory study completed. MAIA<sup>f</sup> begins (through 1998). Maryland Coastal Bay Program initiated.
- 1998-Brown Tide (*Aureococcus anophagefferens*) first detected. DNR begins routine monitoring for *Pfiesteria* at 29 stations throughout the bays and tributaries. DNR plants bay scallops.
- 1999-Brown Tide. Macroalgae present in large masses.
- 2000-Brown Tide. Macroalgae. National Coastal Assessment (continuation of EMAP) begins (through 2004).
- 2001-Brown Tide. Macroalgae. DNR begins routine water quality monitoring at 45 stations throughout the bays and tributaries. Blue crab FMP goes into effect. Restoration of 6.5 acres of salt marsh in Ocean Pines by US Army Corps of Engineers.
- 2002-Brown Tide. Macroalgae. Scallops found north of OC inlet. Hard clam FMP goes into effect. Exotic species survey completed.
- 2003-Brown Tide. Large masses of boring sponges present. US Army Corps of Engineers completed replenishment of 1,800,000 cubic yards of sand on Assateague Island. Creation of eight acres of salt marsh on the Isle of Wight (US Army Corps of Engineers) near completion.

\* EMAP = Environmental Monitoring and Assessment Program

<sup>f</sup> MAIA = Mid-Atlantic Integrated Assessment

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**Table 2.1.1****Historical and Projected Population in the Coastal Bays Watershed**

Source: Maryland Coastal Bays Program

<b>YEAR</b>	<b>POPULATION</b>
Pre-European (1600s)	around 300 Native Americans
1600s through early 1900s	sparsely populated; mostly farmers and watermen
1940	21,245
1990	35,028*
1995	40,300*
2000	47,228*
projected 2010	60,316
projected 2020	72,117

\* These numbers reflect permanent residents only. The number of seasonal residents and vacationers can swell the population to over 300,000 during the summer months.

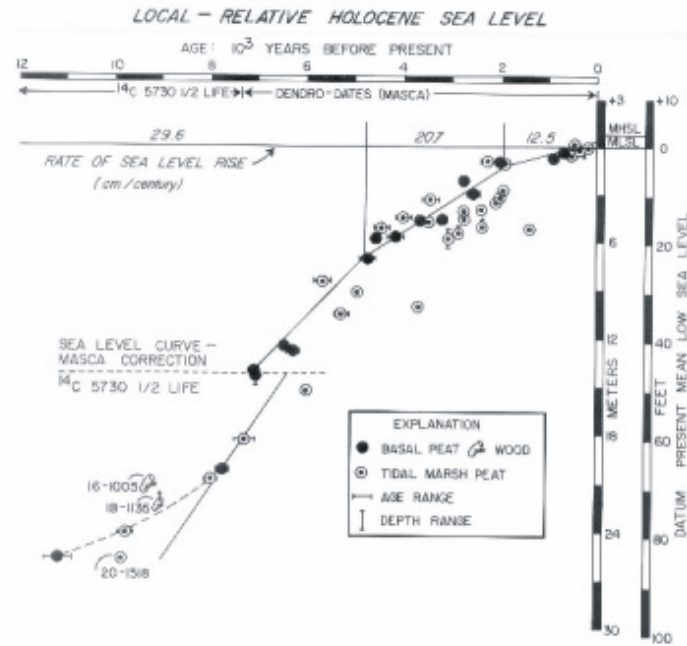


Figure 2.1.1: Local relative sea-level rise curve for the Delaware-Maryland coastal zone based on carbon-14 dating of basal and tidal marsh peat, and wood fragments (Kraft et al, 1987; Toscano et al, 1989). MASCA corrections after Ralph et al (1973). Figure taken from Toscano et al (1989).

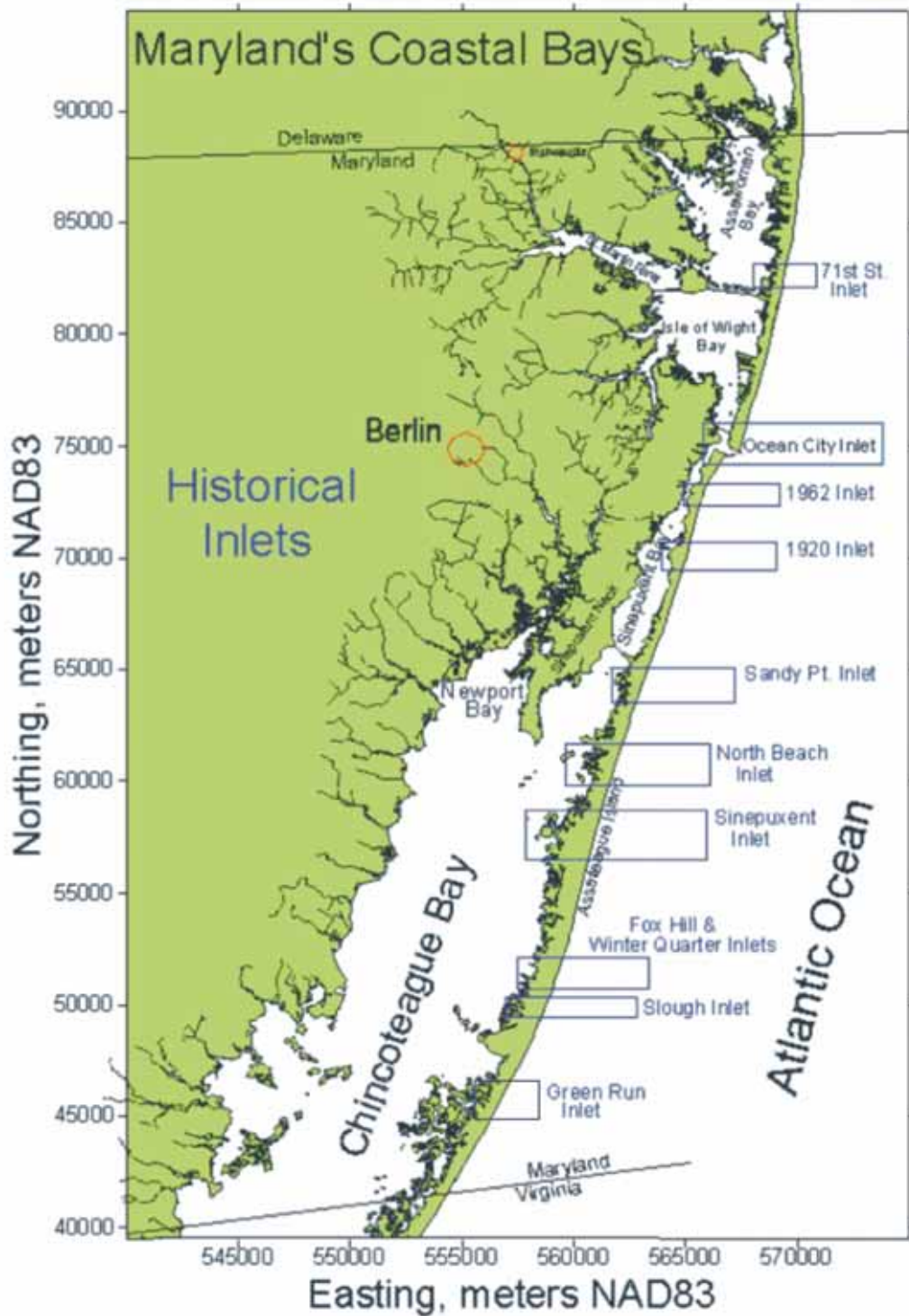


Figure 2.1.2: Historical inlets of Maryland's Coastal Bays. These inlets are described in further detail in the timeline section of the report text.